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Recent Demand-Supply and Growth of Oilseeds and Edible Oil in India: an Analytical Approach

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Abstract

Oilseeds play an important role in providing a nutritionally balanced diet. These are the principal source of edible oil and protein in Indian diets. Oilseeds are boot edible oil processing industry, which are the most important industries of agriculture sector in India. India is a leading player in edible oil, with the World's largest importer from Indonesia and Malaysia and third largest consumer. India is the fourth largest oilseeds producing country in the world after Brazil 100 MT, followed by Argentina 66 MT, China 59.6 MT and India 34.6 MT during 2014-15. Oilseeds are the second main sources of protein after cereals in Indian diet. India is the consumer and importer of edible oil. India accounts for 13-15 per cent of oilseed area, 7-8 per cent of oilseeds production, 6-8 per cent of oilseeds production, 4-6 % edible oil production, 12-14 per cent of vegetable oil import and 10-12 percent of the edible oil consumption. Basically the total oilseed area occupied 28.051 million hectares which contributed production 32.75MT during 2013-14. However, the annual compound growth rate of oilseeds 0.31 % area production 3.35% and yield 3.03 % recorded during recent year (2006-07 to 2013-14) however, it was accelerated growth in area 3.70 % production 6.97% and yield 3.15 % recorded during earlier years (1986-87 to 95-96) era of setup Technology mission on oilseeds during 1986 and the negligible growth were recorded in area 0.01 % production 1.08 % and yield 1.07 % during the middle period (1996-97 to 2005-06) due the peter out effect of oilseeds mission. The demand for edible oils in India has shown a steady growth at a CAGR of 4.96% over the period from 2001 to 2015. The growth has been driven by improvement in per capita consumption, which in turn is attributable to rising income levels and improvement of living standards. However, the current per capita consumption levels of India (at 15.91 Kg/year for 2015-16) were lower than global averages (25 kg/year). Furthermore, domestic consumption of edible oil is expected to increase with enhancement in income level and population. Indian agriculture to support oilseeds production to meet the vegetable oil needs of the Indian population has been considered in the context of available sources of oil from oilseed and non-oilseed origins. India needs to produce 17.84 Mt of vegetable oils to meet the nutritional fat needs of projected population of 1685 million by 2050.

Keywords— Oilseeds, edible oil industry, demand-supply, area, production and yield.

INTRODUCTION:

India is the largest producer of oilseeds in the world and oilseed sector occupies an important position in the agricultural economy of the country. Oilseeds are among the major crops that are grown in the country apart from cereals. In terms of acreage, production and economic value, these crops are second after food grains. The edible oil industry is one of the most important industries of agriculture sector in India. India is a leading player in the industry, with the world's largest importer from Indonesia and Malaysia and third largest consumer. India is the fourth largest oilseed-producing country in the world after Brazil 100 MT, followed by Argentina 66 MT, China 59.6 MT and India 34.6 MT during 2014-15.

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Oilseeds are the main source of fat and protein after cereals in Indian diet. India is the largest consumer and importer of edible oils. India accounts for 13-15 per cent of oilseed area contributed 7-8 per cent of oilseeds production, 6-8 per cent of oilseeds production, 4-6 % edible oil production, 12-14 percent of vegetable oil imports and 10-12 percent of the edible oil consumption. Basically the total oilseed area occupied 28.051 million hectares which contributed production 32.75MT during 2013-14. With its rich agro-ecological diversity, India is ideally suited for growing all the major annual oilseed crops.

Among the nine oilseed crops grown in the country, seven are of edible oils (groundnut, rapeseed-mustard, soybean, sunflower, sesame, safflower and Niger) and two are of non-edible oils (castor and linseed). The Recent study by (Hegde et

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al, 2012) the other miner annual oilseed crops and some plantation crops contributing more than 25% of the total vegetable oil consumption in the country, the minor and TBOs have considerable oil potential which needs to be fully tapped. Oil is obtained from rice bran, cotton seed, corn, coconut and oil palm, apart from seeds of underutilized forest plants like Jatropha *(Jatropha curcas)*, Thumba oil *(Citrullaus colocyntis)* , rubber seed oil *(Ficus elastica)*, mango kernel (Mangifera indica), *Neem oil (Azadiracta indica)*, Karanj oil (*Pongami aglabra*), Mahua (*Madhuca indica)*, Kusum (*Schleichera oleosa*, Sal oil *(Shorea robusta)*, **S**imarouba *(Simarouba glauca), jojoba* (*Simmondsia chinenis*), ***C****heura (Diploknema butyracea* Roxb.*)*, wild apricot *(Prunus armeniaca)* and Tung oil (*Aleurites fordii* Hemsl**.)** etc. The current level of vegetable oils production from all these sources (2.767 Mt) could be further stepped up, given their tremendous potential (> 4.4 MT) study. Indian edible industry facing several issue increasing demand, soaring import bills continuously and decreasing the domestic production of oilseeds due to lower productivity and limited adoption improved varieties and technology.

The recent scenario edible oil in India more than14 million tonnes of edible oil were imported with a total value of `64, 396.50 crore during 2014-15. In terms of volumes, crude edible oil contributes about 89% and refined oil contributes about 11% of the total import during 2014-15. The share edible oil of the 89% of imported crude edible oil, palm oil, soybean oil and sunflower oil contributes about 54%, 21% and 11%, respectively. This article analysis sources of oilseeds growth and Changing pattern area production oilseeds in different period from 1986-87 to 2014-15. Analysis demand-supply share edible oil import and solution for self-sufficiency in edible oil in future. Analyses the constraints on inputs growth like quality seeds, irrigation in recent year and growth of minimum support prices of major oilseed.

OBJECTIVES OF STUDY:

1. Analyse present scenario oilseeds crops area distribution, production and yields.
2. Analyses of growth and instability of area production and yield of major oilseeds state wise.
3. State wise share of area, production and yield of major oilseedscropswise.
4. Analysis changing pattern of area production oilseeds crops wise and state wise.
5. Analysis production, demand consumption of edible oil India in recent years.
6. Analyses the constraints of inputs growth like quality seeds, irrigation in recent year.
7. Analysis the growth of minimum support prices of major oilseeds.

RESEARCH METHODOLOGY:

For the purpose of this study, secondary time series data regarding area, production and productivity oilseed crops (both *Kharif* and *Rabi)* i.e. groundnut, rape-seed mustard, soybean, sunflower, sesame, safflower and Niger, and two non-edible oilseed i.e. castor and linseeds total oilseeds of three periods i.e. 1951-52 to 2013-14 entire period further divides two parts, before launching TMO 1951-52 to 1985-86 and after launching TMO 1986-87 to 2013-14. The annual compound growth rate and instability were analyzed all oilseed crops, however the state wise area, production, yielding changing pattern analyses after launching TMO 1986-87 to 2013-14 as per the data available . The demand - supply, availability for consumption of edible oil and import were also analyzed. The availability of input constraints and MSP of various oilseeds were also analyzed.

i. The Annual compound growth rate model for area, production and yield were estimated using the following model.

$Y = ab^t$

Where,

y = area / production/ yield of oilseed crops

a = intercept

b = regression coefficient of Y on time t

ACGR in (%) = antilog (B -1) * 100

ii. The instability was measured for different periods by estimating the co-efficient of variation of area, production and productivity as follows:

$$CV = \frac{SD}{Mean} * 100$$ Where,

C.V. = Co-efficient of variation,

S.D. = Standard Deviation

RESULT AND DISCUSSION;

1.1 Analysis scenario of oilseed situation in India:

In the agricultural economy of India, oilseeds sector plays an important role next only to food grains in terms of area, production and value. The diverse agro-ecological conditions in the country are favourable for growing all the nine annual oilseeds, which include seven edible oilseeds i.e. groundnut, rape-seed mustard, soybean, sunflower, sesame, safflower

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and Niger, and two non-edible oilseeds, viz. Castor and linseed. Apart from annual oilseeds, a wide range of other minor oil-bearing plants of plantation crops,

including in particular coconut and oil palm are cultivated in the country. In addition, substantial quantity of vegetable oils is also obtained from rice bran and cotton seed.

Oilseeds cultivation was undertaken area 11.69 million hectares contributed 5.03 million tons production and yield 430 kg per hectare during 1951-52 and further area 18.62 million hectares contributed 11.27 million tons production and yield 605 kg /ha during 1986-87 which increased to area 28 million hectares and production 32.79 million tons during 2013-14 mainly on marginal lands, of which 72% was confined to rained farming during the three decades. The oilseeds production was very high variability and co-efficient variations were recorded 31% in *Kharif* followed

24.55 percent in both season *Kharif* and Rabi recorded during 1986-87 to 2014-15. The area and production were observed highly fluctuated due to the diverse agro-ecological conditions and dependency of rain fed in the country. The total oilseeds production drastically downfall from 24.75 million during 1998-99 to 14.83 million tons during 2002-03 about 67 %, however the *Kharif* production depends on fully rain fed highly effected down fall from 15.80 million to 8.97 million tons about 76 % during above same period due to severe drought and unfavourable weather condition. The total area of oilseed less variability than the production and coefficient variation below 10 % during 1986-87 to 2014-15 (see Fig. 1).

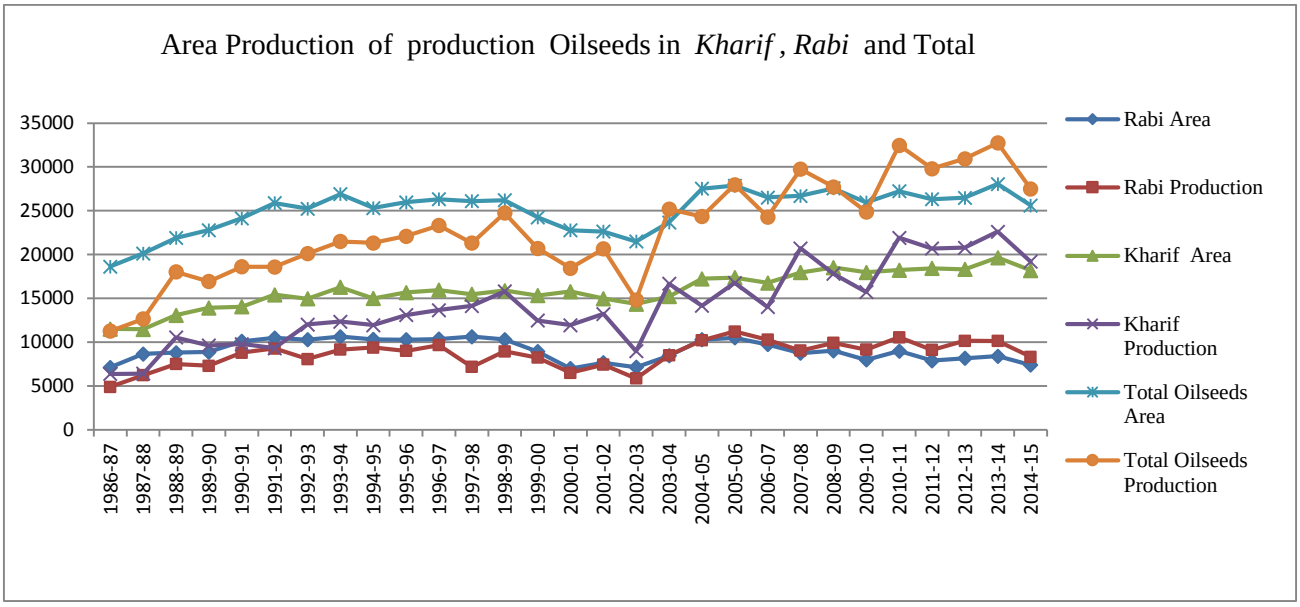

Fig.1: Area Production of production Oilseeds:

Datasource: http://eands.dacnet.nic.in/PDF/Agricultural_Statistics_At_Glance-2015.pdf

1.2 Area and production of oilseed crops:

The area oilseeds of total oilseeds increased dramatically increased 1.7 % after launching the Technology Mission on Oilseeds in 1986-87 to 2013-14 and earlier it was only 1.0% during 1951-52 to 1985-86. The highest annual compound growth rate of area soybean was recorded 7.1 followed by 3.9 in rapeseed mustard and 1.9 % castor while total oilseeds 1.7 % after launching the oilseeds mission in 1986-87 to 2013-14. Soybean was recorded first rank in increasing pattern of area from 1527 thousand hectares to 11716 thousand hectares followed rapeseed mustard are from 3719 thousand hectares to 66.46 thousand hectares and the other oilseeds crops like groundnut area was reduced from 6980 thousand hectares to 5505 thousand hectares followed by sesame from 2164 thousand hectares to 1679 thousand hectares, sunflower area were reduced due to shifted area other competing crops which would have more economic benefits during the period 1986-87 to 2013-14 (see Fig.2).

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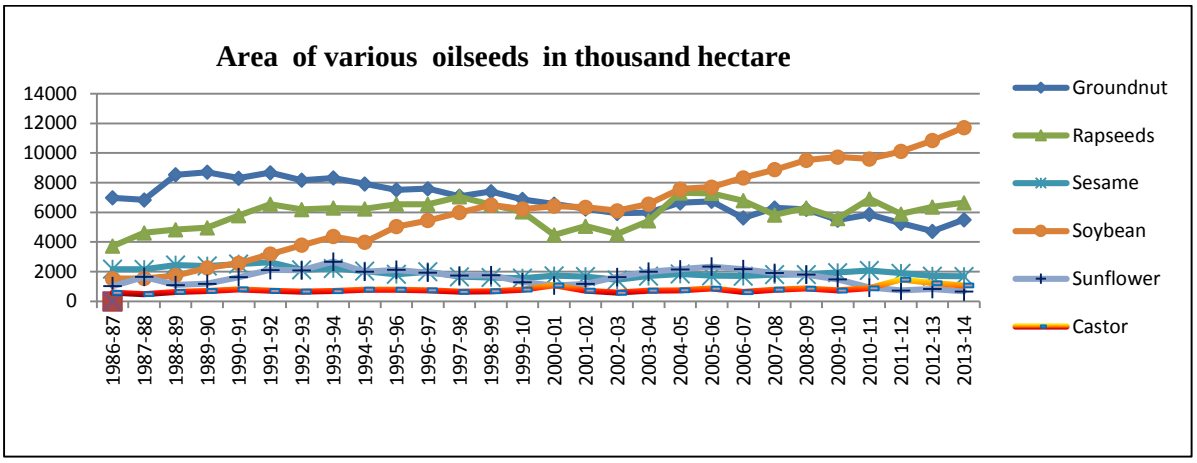

Fig.2: Area of various oilseed crops in thousand

Datasource: http://eands.dacnet.nic.in/PDF/Agricultural_Statistics_At_Glance-2015.pdf

1.3 Share of variousoilseedscrops area and production and changing pattern:

During 1951–2014, the area, production and productivity of annual oilseeds in India showed a compound annual growth rate of 1.57%, 3.01% and 1.42% respectively. Major gain in soybeaninarea as well as production came from third earlier TE 1989 to first position presently and the area increased from 7.92 % to 40.43 %, production increased 7.95 % to 4.1.44 % and the second position rape-seed–mustard area increased from 21.71%to 23.45% and production 24% to 25 % showed stable during the period TE 1989 to TE 2014. The groundnut position was first in area 36.84% to decreased 19.22 % as well as production decreased from 51 % to 22.86 % earlier during TE 1989 to TE 2014. The castor increased both area and production jumped forth position during TE 1989to TE 2014 followed by sesame and sunflower.

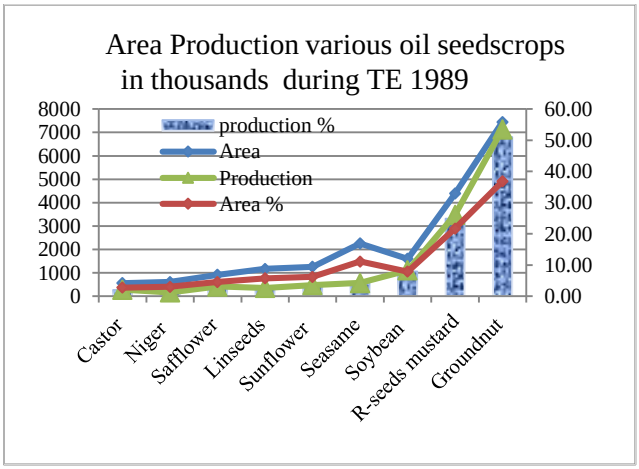

Fig. 3: Area Production during TE 1989

There has been seen large regional variation in area, production and productivity changes during the last two and a half decades. The changing scenario of oilseeds crops due the demand supply and profitability of the meticulous crops. Only a few states like Haryana, Madhya Pradesh, Maharashtra, Rajasthan and West Bengal increased their oilseeds production both through area expansion and productivity improvement. State like Gujarat increased oilseeds production mainly due to productivity improvement. In a state like Punjab, oilseeds production declined mainly in response to a sharp decline in area, whereas in state like Orissa both area and productivity declined sharply leading to large decline in oilseeds production (see Fig. 3 and fig. 4).

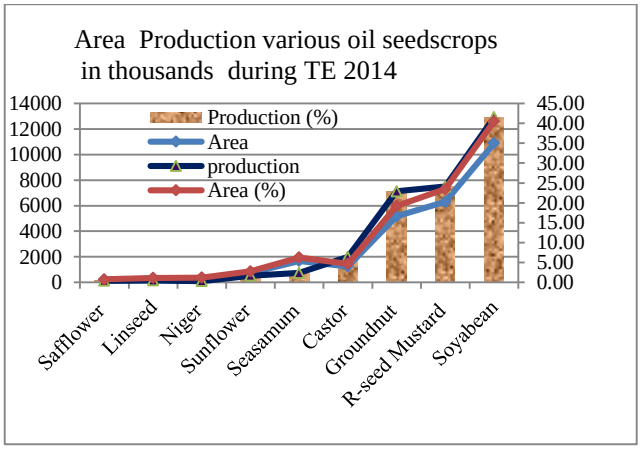

Fig.4: Area Production during TE2014

Data source: http://eands.dacnet.nic.in/PDF/Agricultural Statistics At Glance-2015.pdf

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2. Growth Pattern of oilseeds crops and total oilseeds during three periods:

The Soybean was recorded highest annual compound growth rate were accelerated 32.52 %, 34.28 % in area, production respectively in during the period 1951-52 to 1985-86 compared to 14.33% and 15.94 percent in area and production in during the period 1951-52 to 2013-14 (whole period) and lowest 7.14 % area and 9.00 % production 1985-86 to 2013-14 after the TMO period. The safflower, also recorded the highest growth rate in production 10.24 followed by yield 6.87 % area 3.14 % During 1951-52 to 2013-14 , however the decelerated growth reported during 1951-52 to 2013-14 (whole period) and 1985-86 to 2013-14. The castor non edible oil crop reported sustainable growth rate in area, production and yield and reached forth position during TE 2014 while it was last position during TE 1989. Rape seed Mustard also reported positive growth rate in area, production and yield in all three periods and maintain the second position while lagging behind the third position from first during TE 2014. The some of the crop, i.e. Safflower, Linseeds and Niger were reported the decelerated growth rate in area and production during the period 1985-86 to 2013-14. The annual compound growth rate of total oilseed crops doesn't show the major changes , however the growth rate of area was recorded 0.77 percent minimum during 1985-86 to 2013-14 as compared to the growth rate 1.4 percent in period Ist and IInd all three periods in area, production yield (See table 1).

Table.1:Growth Pattern of oilseeds crops and total oilseeds during three periods

Crops	1951-52 to 2013-14 Period I			1951-52 to 1985-86 Period II			1985-86 to 2013-14 Period II		
	Area	Production	Yield	Area	Production	Yield	Area	Production	Yield
Safflower*	-1.833	0.581	2.460	3.147	10.244	6.876	-5.660	-4.473	1.265
Linseeds	-2.786	-1.656	1.160	0.334	0.512	0.178	-5.389	-3.769	1.708
Niger	-0.696	0.082	0.781	1.348	3.071	1.705	-2.572	-2.575	0.008
Groundnut	0.056	1.033	0.977	1.034	1.545	0.506	-1.729	-0.419	1.337
Sesame	-0.609	0.887	1.506	-0.091	0.314	0.405	-1.140	0.572	1.733
Rapeseeds mustard	1.864	4.013	2.108	1.688	3.267	1.551	0.882	2.589	1.693
Castor	1.244	5.069	3.777	0.112	3.874	3.755	1.865	5.554	3.619
Sunflower*	5.978	6.244	0.248	10.350	6.876	-3.150	-1.390	0.241	1.650
Soybean*	14.330	15.937	1.405	32.523	34.282	1.320	7.143	8.996	1.730
Total oilseeds	1.479	3.070	1.569	1.468	2.290	0.810	0.776	2.709	1.920

Analysed by Author Based on Data source http://eands.dacnet.nic.in/PDF/Agricultural_Statistics_At_Glance-2015.pdf
Data available Safflower* and Soybean* 1970-71 to 2013-14, Sunflower* 1965-66 to 2013-14 for growth analysis.

3.1 State share of oilseeds area and production of Oilseeds:

In India the total oilseed area occupied 28.051 million hectares which contributed production 32.75MT during 2013-14. Madhya Pradesh was recorded first rank 28% area of total area oilseeds and contributed 25 % of total production of oilseeds followed by second Rajasthan 18 % area and 19 % production, third rank Maharashtra area 14 % and 16 % production, fourth rank Gujarat area 11 % and production 16 % which showed higher productivity level 1687 kg per hectare.

The five major oilseed producing states, i.e. Madhya Pradesh, Rajasthan, Maharashtra, Gujarat and Andhra Pradesh were occupied 78 % total area of oilseeds and contributed 81 % total production of oilseeds during TE 2014. The other important oilseeds producing state, i.e. Karnataka, Uttar Pradesh, Tamilnadu and West Bengal and other miner oilseeds producing states, i.e. Assam, Chhattisgarh, Jharkhand and Orissa occupied 6 % area of oilseeds and contributed 4 % production during same period during same period (Fig. 5 and 6).

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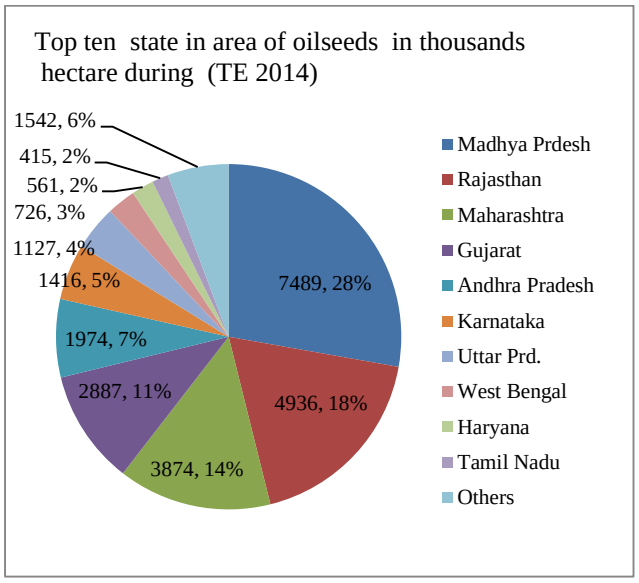

Fig.5

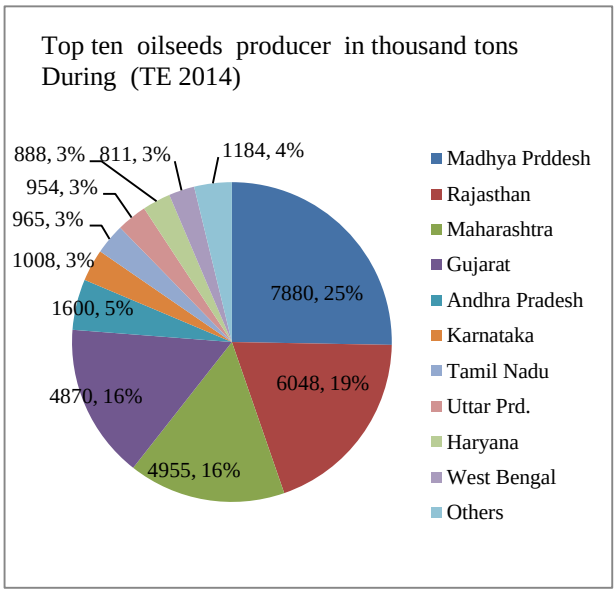

Fig.6

Data source: http://eands.dacnet.nic.in/PDF/Agricultural Statistics_At_Glance-2015.pdf

3.2 State wise pattern of Area, Production of total oilseeds during (TE1988-89 and 2013-14):

Madhya Pradesh is the first rank in the highest oilseed area as well in production and its total oilseed area 2951.90 thousand hectares during TE 1989 and increased to 7489.33 thousand hectares during TE 2014 and produced 1736.43 thousand tons increased to 7879.55 thousand tons during the same period. Madhya Pradesh's leading crop soybean which contributed 41 % share of total oilseeds production and more 50 % share alone of total Soybean. The oilseed area as well in production was increased in the second rank in Rajasthan and its total oilseed area 1904.03 thousand hectares during TE 1989 and increased to 4936.30 thousand hectares during TE 2014 and produced 1352.60 thousand tons and increased to 6047.62 thousand tons during the same period.The leading oilseeds crop in Rajasthan is rape-seed and mustard and 50 % area and 50 % production of rape-seed and mustard.

The oilseeds area as well in production was increased in the Third rank in Maharashtra and its total oilseeds area 2440.93 thousands hectares during TE 1989 which increased to 3873.67 thousands hectares during TE 2014 and contributed the production 1285.80 thousand tons which increased to 4955.23 thousand tons during same period .The oilseeds area as well in production was also increased in the Gujarat and its total oilseeds area 2065.17 thousands hectares during TE 1989 which increased to 2887.33 thousands hectares during TE 2014 which contribute the production 1888.83 thousand tons to increased 4870.14 thousand tons during same period. The leading oilseed crop in Gujarat is groundnut and 31 % area and 26 % production of total groundnut in India. The Haryana is also emerging state where area increased from 338.67 to 560.77 thousands hectares 65.58 percent area and production increased 347.87 to 887.70 thousand tons 155percent, howeverthe All India level area increased from 20218 to 26948 thousands hectares about 33 percent area andproduction increased 13986 to 31162 thousand tons 123 percent during TE 1989 and TE 2014 respectively (see Table 2).

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Table.2:State wise area Production of total oilseeds during (TE1989 and 2013-14)

States	Area in thousands hectares			Production thousands tons		
	TE 1989	TE 2014	Difference %	TE 1989	TE 2014	Difference %
Assam	348.70	293.19	-15.92	168.97	174.21	3.10
Orissa	1078.30	239.14	-77.82	826.55	168.27	-79.64
Karnataka	2398.90	1416.00	-40.97	1385.53	1007.86	-27.26
Andhra Pradesh	2575.60	1973.53	-23.38	1944.20	1600.46	-17.68
Uttar Pradesh	1822.14	1127.33	-38.13	978.77	953.77	-2.55
Madhya Pradesh	2951.90	7489.33	153.71	1736.43	7879.55	353.78
Bihar	218.57	128.11	-41.39	120.73	142.99	18.44
West Bengal	502.33	726.16	44.56	391.28	810.97	107.26
Rajasthan	1904.03	4936.30	159.26	1352.60	6047.62	347.11
Maharashtra	2440.93	3873.67	58.70	1285.80	4955.23	285.38
Punjab	197.63	49.83	-74.78	182.60	67.20	-63.20
Haryana	338.67	560.77	65.58	347.87	887.70	155.18
Gujarat	2065.17	2887.33	39.81	1888.83	4870.14	157.84
Tamil Nadu	1193.77	415.29	-65.21	1261.27	964.95	-23.49
All India	20218.01	26947.71	33.29	13986.10	31162.62	122.81

Data source: http://eands.dacnet.nic.in/PDF/Agricultural_Statistics_At_Glance-2015.pdf

3.3 State wise Productivity difference of total oilseeds during 1988-89 to TE 2013-14:

The annual compound growth rate of productivity of annual oilseeds in India showed 1.57%during 1951-2014 and before TMO AGCR 0.8 during 1951 - 1985 % after launching TMO it increased 1.92%. The productivity of some crops is the important factor of total production, the productivity depends on several factor, i.e. systematically the process of improving agricultural productivity through improved technological progress, optimum level of inputs, assured irrigation, plant protection measures and timely sowing and post-harvest technology and suitable processing ,marketing and storage facilities are very important for improving the productivity of oilseed crops.

The highest total area and production of oilseeds were recorded 153.71% and 353.78% respectively in Madhya Pradesh followed by 159.26 % and 347.11 % in Rajasthan leading in Rajasthan followed by Maharashtra 58.70 %, 285.38% and in Gujarat 39.81 % and 157.84 %, however the National average 33.29 % and 122.81 % respectively during TE 1988-89 to TE 2013-14.

Some of the state showed the down fall area and production of total oilseeds i.e. Orissa -77.82 % and -79.64 %, followed by Punjab -74.78 % and -63.20 % and Tamilnadu - 65.21 % and -23.49 and Karnataka -40.97 % and - 27 % respectively during the same period.

The area is the limited factor and other factors could be increased for the growth of total production. The highest productivity was increased 527 to 1279 kg per ha and 143 % in Maharashtra followed by 1057 to 2324 kg /ha and 120 % in Tamil Nadu followed 552 to 1116 kg / ha and 102% and Gujarat increased yield 915 to 1687 kg /ha 84 %. The other important state like Madhya Pradesh yield 588 to 1052 and 79% kg /ha and Rajasthan yield 710 to 1225 and 72.45 percent. The national average was recorded 692 to 1156kg /ha during TE 1988-89 to 2013-14.

Tamilnadu only state where the area and production were down, falling negatively -65.21 and -23.49 during the same period but increase the productivity 102 %. The area of oilseeds increased some of the states, i.e. Haryana, West Bengal and Uttar Pradesh during TE 1988-89 to TE 2013-14 (see fig 7).

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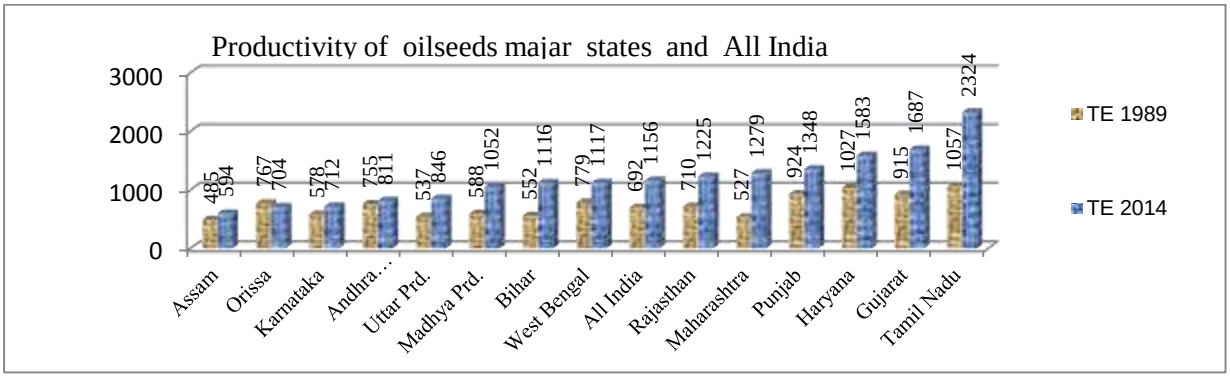

Fig.7: Productivity of total oilseeds during (TE1988-89 and 2013-14)
Data source: http://eands.dacnet.nic.in/PDF/Agricultural_Statistics_At_Glance-2015.pdf

3.4 Improving oilseeds productivity:

Only improving productivity is a better option rather than area because the limited scope to bring the additional area under oilseeds, the bulk of the future increases in oilseed production have to adoption of better technologies, highlighting a combination of high-yielding varieties/ hybrids, balanced and integrated crop nutrition, efficient crop management, protective irrigation, integrated pest management and selective farm mechanization. The post-harvest technology like processing, marketing and proper storage facilities should be assured. It may be achieve an average productivity of about 1.5 t/ha by 2020 and 2.0 t/ha by 2050, if concerted efforts are made for effective dissemination of available improved technologies. The productivity of all oilseeds in India is just 50-60% of the world average and only 15-25% of the productivity observed in the country with the highest productivity, except in case of castor. There is a great opportunity to enhance average productivity of all oilseed crops in the country, which needs concerted efforts in the coming year to increase better seed replacement rate. The improving the highest productivity in groundnut during Rabi- summer recorded 1883 kg/ha and in *Kharif*513 kg/ha, which increased 267 % in Andhra Pradesh followed west Bengal 2393 kg/ha in Rabi and *Kharif* 927 kg/ha increased 158% and Tamilnadu 3509 kg/ha in Rabi and *Kharif* 2102 kg/ha increased 67 % in Rabi summer groundnut crop with the insured irrigation condition. The best option to increase production groundnut, it needs to increase the area of groundnut in *Rabi/Summe*r season. There was untapped potential and scope for increasing productivity of groundnut like in Tamilnadu more 3500 kg / ha and could be achieved in all groundnut producing states in India during Rabi season. There was huge opportunity to occupied rice fallow and early potato harvested area in west Bengal, Orissa and Andhra Pradesh (see fig. 8).

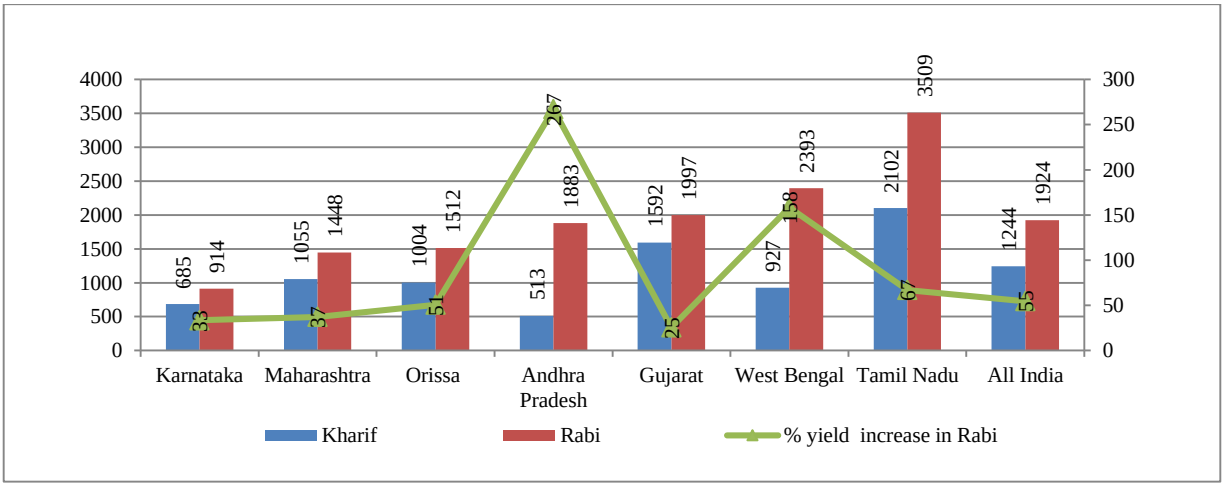

Fig.8: Analysis increase percentage yield in Rabi over the Kharif season
Data source: http://eands.dacnet.nic.in/PDF/Agricultural_Statistics_At_Glance-2015.pdf

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4.1 Changing Area and Production of oilseed crops:

The major gain in production came mostly from soybean, rapeseed-mustard, sunflower and castor after launching Technology Mission on oilseeds during 1986-87. There has also been large regional variation in area, production and productivity changes during the last two and a half decades. Only a few states like Madhya Pradesh, Rajasthan, Maharashtra, Haryana and West Bengal increased their oilseeds production both through area expansion and productivity improvement. State like Gujarat and increased oilseeds production mainly through productivity improvement. In a state like Punjab, oilseeds production declined mainly in response to a sharp decline in the area, whereas in states like Orissa, both area and productivity declined sharply leading to large declines in oilseeds production. The Only Bihar state declined the area 40 % and production increased 18 % due to increase the productivity 102 per cent during the TE1988-89 to TE 2013-14.

The domestic achievements in oilseeds production didn't parallel when we observe that 6.5 times increase in oilseeds production during the period 1950-2014 was achieved under predominantly rain fed (72%) agro-ecological conditions, which is even higher than the production increase in total food grains during this period1950-2014. It is worth recording that 5.20 times increase in production of food grains was achieved with the highest national priorities for this commodity group, and also that such production jump was recorded under relatively much more favourable farming environments, particularly with more than 50 % area irrigated condition, while oilseeds covered only 28 percent under irrigated which was low as compared to rice 60 percent and wheat 90 percent during recent year 2013-14.

4.2 consumption of vegetable oil in India:

The vegetable oil consumption is both income and price-elastic. The per capita consumption of vegetable oils has increased from around 3 kg/year in 1950 to 14.2 kg/year during 2010-11. Increase in per capita income pushes the demand for oil significantly. A similar effect is exercised by the price factor as well. In contrast to the pre-WTO period, the real price of vegetable oils had sharply declined in the subsequent period which enabled consumers to access large quantities that were made possible through liberal imports. There have been dramatic changes in the oilseeds scenario of the country during the last 35 years. India changed from net importer 39 percent of total consumption status in the 1980s to which was downfallen 9.73 percent 1990-91 import of edible downfall which was again reversed 15. 78 percent during 1995-96 and due the drought during 2000-01 edible import was raised 48.68 percent when the country had to spend huge foreign exchange to meet the domestic needs of edible oils. However, as per capita consumption of edible oils has risen significantly.

5.1 Analysis of demand supply gap of edible oil in India:

The total demand in the country has risen at a very high rate and has created a big gap between domestic production 8978 thousand tons, consumption 21709 thousand tons and edible imports increased by 67.33 percent during 2014-15.Demand of edible oil is mainly driven by an increase in per capita consumption of edible oil, rising income levels and improvement of living standards. However, the Indian edible oil market continues to be interpenetrated as current per capita consumption level of India (at 14.4 Kg/year for 2014-15) is much lower than global averages (24 kg/year). Furthermore, domestic consumption of edible oil is expected to increase with enhancement in income level and population (see Fig. 9)

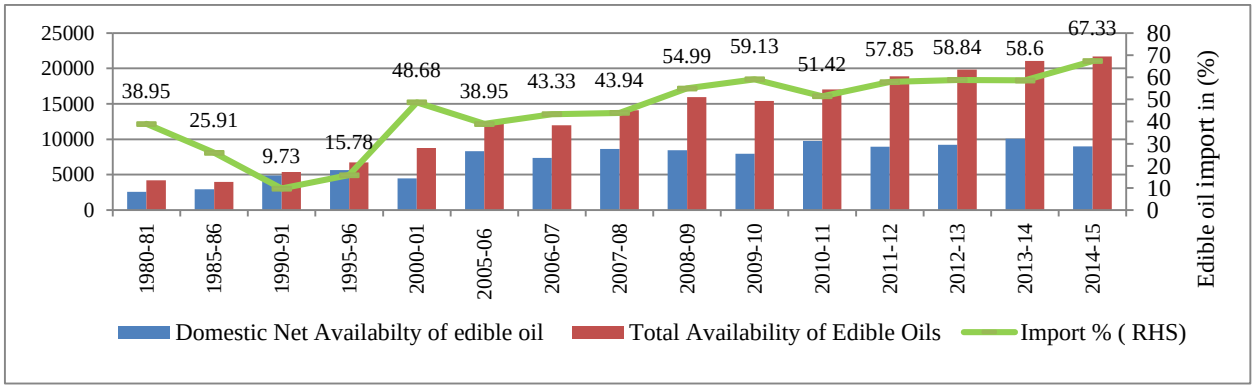

Fig.9: Demand Supply gap and import of edible oil in thousand tons in India

Data source: CMIE 2015-16

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The gap between export earnings and import costs started narrowing down during the last 10 years, and during 2007–08, the oilseeds sector became a net earner of foreign exchange, which however, could not be sustained for long run. During 2010–11, the country imported about 9.2 Mt of vegetable oils costing around `38,0000 millions to increased import whereas export earnings were a little less than just ` 21,0000 millions The recent scenario edible oil import in India more than14 million tonnes of edible oil was imported with a total value of `6,43,965.0 millions during 2014-15 and likely to increase `6,86,300.0 millions during 2015-16.

5.2 Import of edible oil in India:

In terms of volumes, crude edible oil contributes about 89% and refined oil contributes about 11% of the total import during 2014-15. The share edible oil of the 89% of imported crude edible oil, palm oil, soybean oil and sunflower oil contributes about 54%, 21% and 11%, respectively. India is importing edible oil from Indonesia, Malaysia, Argentina and Ukraine, contributing about 36%, 23%, 17% and 13%, respectively, of total imports. The domestic consumption of edible oils has increased substantially and has touched the level of 18.90 million tonnes in 2011-12 and is likely to increase further 21.70 million tonnes during 2014-15. The total import edible oil likely to be estimated for 2015/1614.85 million tons higher 6.6% previous year 2014-15, however crude edible oil 9.6 million tons, soybean oil 3.55 million tons, sunflower 1.45 million tons and rape-seeds mustard 0.25 million (see table 3).

Table.3: Import of edible oil during 2011/12 to 2014/15 and Estimate for 2015/16

(Figures in Lac MT)

Crops	2011/12	2012/13	2013/14	2014/15	2015/16	Increase in 5 Years
Palm Oil	76.70	82.90	79.60	90.40	96.00	**25%**
Soybean	10.80	10.90	19.50	30.10	35.50	**230%**
Sunflower	11.40	9.70	15.10	15.10	14.50	**25%**
Rape seeds	0.90	0.30	2.00	3.70	2.50	--
TOTAL	99.80	103.80	116.20	139.30	148.50	**50%**
Import*	**19.2%**	**4.0%**	**11.9%**	**19.9%**	**6.6%**	

Data Source: Edible oil plus vanaspati

* Percentage higher over the previous year

6. 1 Analysis of constraints of inputs growth:

The oilseed economy of the country faces a host of challenges on technological, institutional and policy fronts. The capability in designing and implementing innovative approaches to adequately address each of these challenges will determine the future of the oilseed economy of India. Oilseed cultivation in India is predominantly dependent on rainfall and this leads to a higher magnitude of instability in the production of oilseeds 58.85 percent, followed by 43.71 percent in rice and 42.80 percent food grain and instability in under irrigated area were recorded in total oilseeds 64 percent, followed by 33 percent in total food grain and 17 percent in rice during the period 1951-52 to 2012-13. In case of under irrigated area, the oilseeds recorded the lowest 28 percent, followed by 51 percent in total food grain, 53 percent in rice and the highest in wheat 93 percent during 2012-13. Often, the marginal lands are earmarked for cultivation of oilseed crops. Such inherent disadvantages ensure that a levelled field is not provided to the oilseed crops even when they are being compared increasingly with their competing crops in terms of production, productivity and profitability were low (see fig. 10).

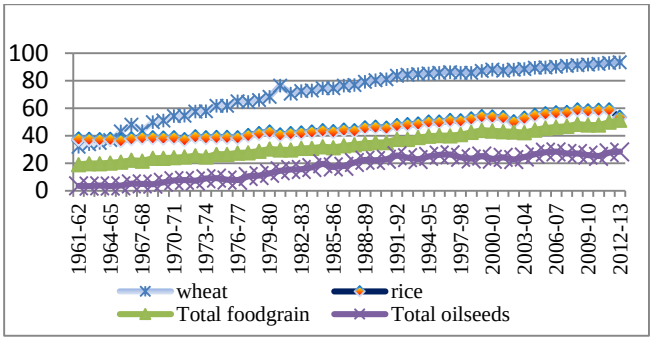

Fig.10: Percent area under irrigation of various crops

Data source:http://eands.dacnet.nic.in/PDF/Agricultural_Statistics_At_Glance-2015.pdf

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6.2 Distribution of certified/quality seeds:

The supply of certified/quality seeds of oilseeds was remains constant from 10 to 13 lakh quintal and growth rate 2 percent during 1991-92 to 2002-03, while cereals seeds almost reaching to double 35 to 67 lakh quintal tons and growth rate 7 percent during the same period. Due to the constant supply of certified/quality a seed of oilseeds the productivity was also remains constant 718 to 702 kg per hectare during the period 1991-92 to 2002-03, but pressure of population created huge demand of edible oil and increase the import. The supply of certified/ quality seeds of oilseeds was increased from 19 to 43 lakh quintal and the growth rate 11 percent during 2003-04 to 2014-15, while cereals seeds almost reaching to tripled 71 to 203 lakh quintal and the growth rate 11 percent during the same period . The supply of certified/ quality seeds of oilseeds had not been reflected in the average productivity of pulses double or triple but it was hovering around 1064 to 1168 kg per hectare during 2003-04 to 2014-15 recently respectively, while the experimental research station claimed yields were 2 to 3 tons per hectare. This revealed that Large-scale demonstrations in farmer's fields need to be conducted with the involvement of extension agencies of ICAR, SAUs, KVKs, etc. These efforts may easily push average productivity slightly higher from 1064 to 1168 kg per hectare during 2003-04 to 2014-15, that's why farmers were not much attracted to increase the area of oilseeds (see figure 11**)**.

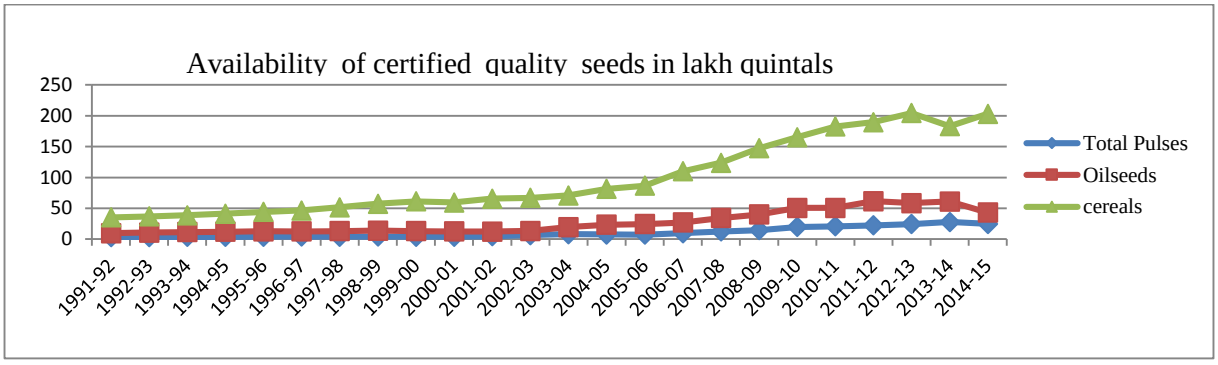

Fig.11: Distribution of certified/quality seeds

Data source: http://eands.dacnet.nic.in/PDF/Agricultural_Statistics_At_Glance-2015.pdf

7.1 Minimum support price of different food grain crops and pulse:

To encourage oilseeds production, the CACP has fixed the minimum support price (MSP) the highest increase in sesame `1300 per quintal during the 2000-01 to hike four times ` 5200 this year 2016-17 followed by groundnut `1220 per quintal to hike of`4320 per quintal and sunflower increased only`1200 per quintal to hike ` 4000 during the same periods while, wheat MSP increase only `610 to 1625during 2000-01 to 2016-17 less than the three times. The cost of production increase substantially over the past few years. The increase in support price should help farmers to offset the production cost increase. This resulted oilseeds production surge less than double18 million tons to 33 million tons during 2000-01 to 2013-14. Increasing the minimum support price not any impact the increase the total production of oilseed crops in the same manner (see fig. 11).

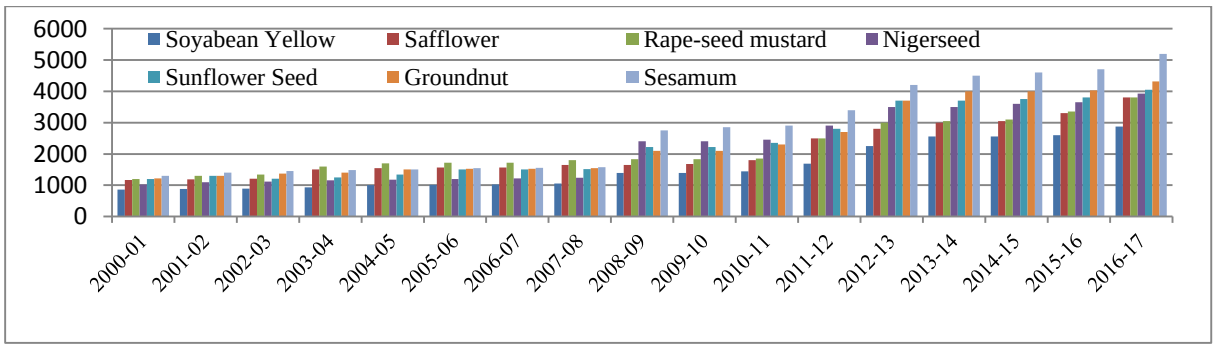

Fig.11: Minimum support price of oilseeds crops:

Data source: http://eands.dacnet.nic.in/PDF/Agricultural_Statistics_At_Glance-2015.pdf

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7.2 Annual compound growth of Minimum support price:

The annual compound growth rate of various oilseeds were recorded the highest 6.86 percent in Niger seed followed by sesame 6.08 percent and the lowest 4.70 percent in soybean as compared to wheat was 7.07 percent during the 2000-01 to 2008 - 09, this the great set back to all oilseeds crops and farmers to leave growing due to the less annual compound growth rate of minimum support price and the market price more than double during the same period due to the increase domestic demand of edible oil while production was stagnated in same period . The farmers have refused to sell soybean to the government agency at a measly MSP of `1000 to 1050 per quintal increase in four years 2004-05 to 2007-08 when regulated marketsare offering them more than double that rate. The traders make their work easier by paying more than the MSP and by lifting the stock from their doorstep itself.

The policy makers awaken after a long time when the edible oil demand surged to 16 percent to 44 percent of total domestic production from during 1995-96 to 2007-08 while MSP increased slightly see figure 11. The domestic prices of oilseeds sudden bursts of high prices increased `80 to 150 almost doubled during 2014-15 the farmers shift to their land to oilseeds, in hope of better returns, despite the high cost of production. The policy decision maker had been increased the MSP of oilseeds increase in very fast track to minimize the import bills. The highest growth rate of MSP was recorded 13.13 percent in groundnut followed by 13.09 percent in Soybean, 12.39 percent in Safflower and rape-seed mustard 11.50 percent in chick and minimum in wheat 5.81 percent during 2009-10 to 1016-17 (see Table 4).

Table.4: Annual compound growth of Minimum support price:

Crops	Wheat	Niger	Sesame	Sun flower Seed	Rapeseed / mustard	Saf flower	Soybean Yellow	Ground-nut
2001-01 to 2008-09	7.07	6.86	6.08	6.03	5.53	5.00	4.70	5.10
2009-10 to 2016-17	5.81	8.21	10.14	10.65	11.49	12.36	13.09	13.13

Data source: http://eands.dacnet.nic.in/PDF/Agricultural_Statistics_At_Glance-2015.pdf

7.3. Marketing processing constraints oilseeds:

All traditional oilseeds are reserved for the small-scale sector with an inefficient processing setup, losing more than one million tonnes of oil. There is a need to decontrol all these oilseeds to enhance efficiency of the processing sector. India has large processing industry with low capacity utilization leading to high processing cost in soybean and mustard. Opening up all oilseeds to modern processing will lead to efficient processing, benefiting both producers and consumers. Indian oilseeds processing sector are fragmented, small scale and suffers from low capacity utilization. The Indian oilseed processing industry includes major processing technologies such as traditional mechanical crushing, or expelling, used for oilseeds with relatively high oil-content; and solvent extraction for processing oilseeds and expeller cake. The Traditional mechanical crushing industry includes small-scale expellers.

The processing industry also includes an oil refining sub-sector, which primarily refines domestic solvent-extracted oils and imported crude and solvent-extracted oils. Recently, Government of India has withdrawn the import duty on crude oils and this has facilitated the increased import of edible oils, viz. Palm oil and also the mixing the palm oil with edible oil to a certain extent have also been made legal by government of India. Import of cheap oils like palm oil in India in comparison to available edible oils (mustard oil) has decreased the demand of mustard oil in the market, which is ultimately affecting the small and medium oil processing sectors. Availability of raw material is not a cause of low demand; it is only due to the low price of imported oils and blended oil.

8 .1 Supplementary sources of other vegetable oils:

Contributing more than 25% of the total vegetable oil consumption in the country, the minor and TBOs have considerable oil potential which needs to be fully tapped. Oil is obtained from rice bran, cotton seed, corn, coconut and oil palm, apart from seeds of underutilized plants like Jatropha, Thumba oil , rubber seed oil , mango kernel, Neem oil, Karanj oil, Mahua, Kusum, Sal oil, **S**imarouba, jojoba, **C**heura, wild apricotand Tung oil etc. The current level of vegetable oils production from all these sources

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(2.767 Mt) could be further stepped up, given their tremendous potential

8.2 Rice bran oil:

Rice bran oil is an important source of vegetable oil, which is not yet to be fully exploited. India is the second largest rice producer in the world, next only to China. The country produced 142.00 Mt of paddy during 2010- 11, which is equivalent to 94.11 Mt of rice, and this could yield 80.00 lakh tonnes of rice bran which has the potential to yield 13.20 lakh tonnes of rice bran oil. However, the country could produce only 8.5 lakh tons of rice bran oil during 2010-11 and 9.0 lakh tons in 2014-15. The annual growth rate of paddy 2.5 percent during the period 2.5 during the period 1951 to 2015 in India, which can make a significant contribution to the vegetable oils basket. At the same time, a large number of high-value by products needs to be recovered during the rice bran oil processing, which will change the economy of the entire process. By 2050, India is expected to produce about 160 Mt of rice, which has the potential to yield 2.244 million tonnes of rice bran oil. Even if 90% of this potential is realized, the country must be able to produce about 2 Mt of rice bran oil.

8.3 Cotton seed oil:

India is one of the major cotton-producing countries of the world. Cotton seed, which forms about two-thirds of the ratio of Seed and cotton, contains an important source of vegetable oil. The cotton seed contains about 18% oil, which is nutritionally good oil. India produced 33.930 million bales of seed cotton yielding 11.40 Mt of cotton seed during 2010-11, and produced 1.199 million tons of oil through traditional processing technology, wherein only 11-12% of oil is recovered (Table 4). Nearly 95% of cotton seed is processed through traditional methods and less than 5% is processed through scientific processing which can recover nearly 17% of the oil. Thus, a huge amount of oil of the order of 0.65 million tonnes is lost, which is worth more than ` 25000 million. In addition, there is also loss of linters, hulls and soap stuck in traditional processing and together with the lost oil, the country is losing about ` 50000 million worth of products, which needs to be pre-vented on priority. By 2025 and 2050, the cotton production in India is projected to increase to 50.0 and 65.0 million bales respectively, which can lead to a marketable surplus of 167.82 and 208.45 lakh tonnes of cotton seed for processing that, can potentially yield 2.853 and 3.544 million tonnes of cotton seed oil respectively. This will be a huge contribution to India's vegetable oils basket, which needs to be fully exploited through scientific processing of cotton seed. There is a need for a policy intervention to make scientific processing of cotton seed mandatory along with certain incentives or one-time grant for switchover from traditional processing in the larger interest of the country.

8.4 Oil palm:

Among the major tree crops, oil palm farms another high-potential prospective and long-term source of edible oil, which is expected to contribute significantly towards meeting the growing edible oil demand in the country. It can yield 4-7 tons of oil/ha compared to less than half a tonne from most of the annual oilseed crops. As against the potential area of 1.0715 million ha spread over 14 states in the country, hardly 1.6 lakh ha was planted up to March 2011, of which almost 30,000 ha was uprooted. The country is currently producing just about 74 thousand tonnes of oil from a barren area of about 40,000 ha. In the years to come, oil palm is likely to play a major role in augmenting the supply of vegetable oil in the country. By 2050 even if an area of 800 thousand ha is covered under oil palm, the country must be able to produce about 3.2 Mt of oil. There is a need for proper policy back-up along with remunerative prices for sustaining the long-term commitment of the farmers to oil palm.

9 Intervention of Government to slow down import of edible oil:

In policy improvement its current (12th) Five-Year Plan (Indian fiscal year 2012/13 to 2016/17), the National Mission on Oilseeds and Oil Palm **(**NMOOP**)** is targeting vegetable oil production to reach 9.51 MMT, a 35 percent increase over the previous Five-Year Plan's average (7.06 MT). This was initiated in response to India's growing reliance on imported palm oil from Southeast Asia. NMOOP claims that India can achieve greater levels of independence in vegetable oils if it can boost production in various oilseeds, oil palm, and tree borne oilseeds.

Government of India is to achieve objectives such as increasing Seed Replacement Ratio (SRR) in oil crops with focus on Varietal Replacement, increasing irrigation coverage under oilseeds from 26% to 36%, diversification of area from low yielding cereals crops to oilseeds crops, inter-cropping of oilseeds with cereals/ pulses/ sugarcane, use of fallow land after paddy/potato cultivation, expansion of cultivation of Oil Palm and tree borne oilseeds in watersheds and wastelands, increasing availability of

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quality planting material enhancing procurement of oilseeds and collection, and processing of tree borne oilseeds. The existing oilseed technologies could be achieved 43 Mt of oilseeds production, which is almost adequate to meet the requirement of vegetable oils in the country. Future needs of vegetable oils to meet the nutritional fat needs, even by 2050 can easily be met if we can increase production of supplementary sources of edible oils along with bridging the yield gap in annual oilseeds. However, unbridled increase in vegetable oils.

The cost of interventions under the mission was in the ratio of 75:25 between central and states. However, for components like seed production, Front Line Demonstration (FLD), mini-kits, adaptive research being implemented through central agencies such as State Agricultural Universities (SAU) and Indian Council of Agricultural Research (ICAR) institute are being funded through 100% central support. There are three mini missions in this scheme viz. Mini-mission-I, II and III. Mini Mission-I focuses on oilseeds, Mini Mission II on oil palm and Mini Mission III on tree-borne oilseed. The mission aims to enhance production of oilseed from 28.93 million tonnes (average of 11th five year plan) to 35.51 million tonnes by 2016-17 and to bring additional area of 1.25 lakh hectare under oil palm cultivation with increase in productivity of Fresh Fruit Bunches (FFB) from 4927 kg/ha to 15,000 kg/ha by end of 12th five year plan.

CONCLUSION:

India is the fourth largest oilseeds producing country in the world after Brazil 100 MT, followed by Argentina 66 MT, China 59.6 MT and India 34.6 MT during 2014-15. Oilseeds are the second main sources of protein after cereals in Indian diet. India is the consumer and importer of edible oil. India accounts for 13-15 per cent of oilseed area, 7-8 per cent of oilseeds production, 6-8 per cent of oilseeds production, 4-6 % edible oil production, 12-14 per cent of vegetable oil import and 10-12 percent of the edible oil consumption. Basically the total oilseed area occupied 28.051 million hectares which contributed production 32.75MT during 2013-14. The demand for edible oils in India has shown a steady growth at a CAGR of 4.96% over the period from 2001 to 2015. The growth has been driven by improvement in per capita consumption, which in turn is attributable to rising income levels and improvement of living standards. However, the current per capita consumption levels 15.91 Kg/year in India for 2015-16.

The Soybean was recorded highest annual compound growth rate were accelerated 32.52 %, 34.28 % in area, production respectively in during the period 1951-52 to 1985-86 compared to 14.33% and 15.94 percent in area and production in during the period 1951-52 to 2013-14 (whole period) and lowest 7.14 % area and 9.00 % production 1985-86 to 2013-14 after the TMO period. The safflower, also recorded the highest growth rate in production 10.24 followed by yield 6.87 % area 3.14 % During 1951-52 to 2013-14. The Major gain in soybean in area as well as production came from third earlier TE 1989 to first position presently and the area increased from 7.92 % to 40.43 %, production increased 7.95 % to 4.1.44 % and the second position rape-seed–mustard area increased from 21.71%to 23.45% and production 24% to 25 % showed stable during the period TE 1989 to TE 2014. The groundnut position was first in area 36.84% to decreased 19.22 % as well as production decreased from 51 % to 22.86 % earlier during TE 1989 to TE 2014.

The strategy to implement the proposed Mission will include increasing Seed Replacement Ratio (SRR) with focus on Varietal Replacement; increasing irrigation coverage under oilseeds from 26% to 36%; diversification of an area of low yielding cereal crops to oilseed crops; inter-cropping of oilseeds with cereals/ pulses. The improved technology packages were also found to be economically attractive. In policy improvement its current (12th) Five-Year Plan (Indian fiscal year 2012/13 to 2016/17), the National Mission on Oilseeds and Oil Palm **(**NMOOP**)** is targeting vegetable oil production to reach 9.51 MMT, a 35 percent increase over the previous Five-Year Plan's average (7.06 MT). This was initiated in response to India's growing reliance on imported palm oil from South East Asia. NMOOP claims that India can achieve greater levels of independence in vegetable oils if it can boost production in various oilseeds, oil palm, and tree borne oilseeds (TBOs).

Government of India needs to carry out major reforms in oilseed cultivation to spur the stagnating growth. This is required for ensuring that the country has self sufficiency in the edible oil segment as the consumption of edible oils will continue to grow due to rising per capita income levels and improvement of living standards and domestic net availability of edible oil growth rate accelerated at 2.19 percent lesser than the **t**otal availability of edible oils including import growth rate accelerated at 7.09 percent during the period during period 2005-06 to 2013-14 , so

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there was difference between all most 5.00 percent deficit the growth rate in of domestic supply , that fulfil through import of edible oil . The government proactive to reduced the import duty on edible oil 80 to 20 percent during 2006 to 2015 due to the cheap supply of palm oil and fulfil the domestic demand and control the prices of domestic edible oil.

Another measure which can be considered is to pay special incentives to farmers to switch from excess cereals cultivation to oilseed cultivation. India, on one hand, has excess of cereals, which have to be exported at cheap rates for want of proper storage facilities, and on the other, imports edible oils which are in short supply in the domestic market. The improving the highest productivity in groundnut during *Rabi- summer* recorded 1883 kg/ha and in *Kharif* 513 kg/ha, which increased 267 % in Andhra Pradesh followed west Bengal 2393 kg/ha in Rabi and *Kharif* 927 kg/ha increased 158% and Tamilnadu 3509 kg/ha in Rabi and *Kharif* 2102 kg/ha increased 67 % in *Rabi summer* groundnut crop with the insured irrigation condition.

The best option to increase production groundnut, it needs to increase the area of groundnut in *Rabi/Summe*r season. There was untapped potential and scope for increasing productivity of groundnut like in Tamilnadu more 3500 kg / ha and could be achieved in all groundnut producing states in India during Rabi season. There was huge opportunity to occupied rice fallow and early potato harvested area in west Bengal, Orissa and Andhra Pradesh.

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